appeared at a time when the Sun as a whole was extremely active. A photograph of the Sun showing this group somewhat past its prime was reproduced by Mr. Ellerman in the February number of these PUBLICATIONS (Plate I). The only rivals of these two huge groups, which have been observed during the past half century, were in February of 1892 and 1905, respectively.

SETH B. NICHOLSON.

NINETEEN NEW VARIABLE STARS

In the course of a study of the magnitudes of the southern globular cluster Messier 68 (N. G. C. 4590; R. A. $= 12^h34^m.2$, Decl. $= -26°12'$, 1900.0), a number of stars of the sixteenth magnitude were found by Miss Ritchie to vary in light. The following list gives the position of the variables with respect to the center.

POSITIONS IN VARIABLES IN MESSIER 68

Star No.	x	y	Star No.	x	y
1	−4′40″	+1′49″	11	+0′19″	−1′36″
2	−2 48	−0 45	12	+0 33	+1 10
3	−2 20	+1 31	13	+0 48	+0 8
4	−1 57	−2 11	14	+1 1	−0 22
5	−0 56	+2 50	15	+1 4	+6 20
6	−0 31	+0 40	16	+2 21	+2 3
7	−0 4	+3 38	17	+2 38	−0 44
8	+0 9	+0 58	*18	+6 20	+4 23
9	+0 11	+1 20	19	+7 20	+2 40
10	+0 16	−1 15			

Variable No. 18, one of the brightest stars in the cluster, appears to have a long period. All the others are probably typical cluster-type variables. Their amplitudes are of the order of one magnitude and their periods are short.

The median brightness of these short-period variables is between one and two magnitudes fainter than the brightest cluster stars, closely agreeing in this respect with the results for other clusters that contain Cepheid variables. A study of the light variations, therefore, will yield an accurate value of the parallax and absolute magnitudes for all the stars in the cluster. HARLOW SHAPLEY.

THE "NEW STAR" IN SERPENS, 7.1917

Two years ago, while photographing the position of the asteroid *Boliviana*, Professor Wolf found an image (magnitude 9.0 on the B. D. scale) that was not recorded on any of his plates prior to 1910 (*A. N.*, **204**, 293, 1917). Visual observations by Mündler and Wolf verified the star's existence but showed no variation in light. Later the designation 7.1917 was assigned to the object.

The position for 1917.0, determined by Mündler (*A. N.*, **204**, 344, 1917), is

R. A. $17^h35^m13^s.45$ }(Epoch of 1917.45)
Decl. $-11°53'57''.6$

Hoffmeister, observing visually for sixteen months, found no conspicuous variation in light (*A. N.*, **208**, 244, 1919). More recently Wolf has published a list of forty-one plates dating from 1895 to 1917; none of the twenty-nine before July, 1910, shows the star, and none of the later ones fails to record it (*A. N.*, **208**, 363, 1919).

Not knowing of the earlier discovery and discussion, Professor Barnard independently found the star a few months ago and has published three notes concerning it (*Astronomical Journal*, Nos. 749 and 750; *Popular Astronomy*, **27**, 374, 1919). With the assistance of Harvard plates dating from 1891 he finds that the star appeared between June 29, 1908, and July 9, 1909.

The spectral type as determined at Mount Wilson is F0; the radial velocity is large and positive.

This object appears to me to be one of the most remarkable on record. While at present it is difficult to decide which hypothesis is preferable, three possible interpretations of the star may be suggested:

1. A new star evolving from a non-luminous, nebulous beginning.
2. A long-period or irregular variable of a new kind.
3. A normal invariable star coming from behind obscuring nebulosity.

The star is called a variable by Wolf, Barnard, and Bailey, but the evidence now in hand, I believe, would rather justify the name "new star," using that designation in a different and better sense than when applied to Novae. The Novae, more appropriately "temporary stars," are probably now considered by no one to be forerunners of typical stars. Before the outburst of light, they frequently, probably always, exist as stars of a brightness not much less than the magnitude to which they slowly return. They appear to be occasional stellar catastrophes—possibly indeed the forerunners of planetary nebulae and dwarf O-type stars. But it seems likely that the ancestry of the innumerable ordinary stars must be sought in phenomena of a different sort.

The birth of a typical star (that is, the pre-giant stages in Russell's theory of spectral evolution) is not yet on record, so far as we know. It may be, as pointed out in *Mount Wilson Contribution*, No. 156, that we have failed to find embryonic stars because

either the genesis is now complete, or it is occurring in regions not under observation, or, more reasonably, wherever and whenever it occurs the pre-giant stage passes so quickly, compared with the later spectral development, that our relatively short records fail to show for a single stellar object the growth from obscurity to full and fairly constant brilliancy. This last point of view is supported by Russell's interesting discussion of the sources of stellar energy, printed on a preceding page of this issue. The rapid "birth," according to his suggestion, occurs during the time when the star's radiative energy emanates solely from gravitative sources; the much slower development then proceeds at the expense of internal "unknown" sources of energy.

Probably, therefore, the beginning of a star should show relatively rapid secular increase in light from invisibility to the stage where for that particular stellar mass the immeasurably slow process of ordinary stellar evolution sets in; the beginning should be represented by a "Nova that maintains its maximum brightness." In the object 7.1917 we appear to have the first well-authenticated case of such an occurrence, and hence the unusual significance of the star. There have been instances of stars, not recorded in the earlier surveys, that are now sufficiently bright to have been included. Probably these omissions are rightly attributed to error, oversights in the earlier work, or small secular changes in brightness, rather than to the appearance of new stars of permanent maximum magnitude.

Neither the spectral type of 7.1917 nor its brief ascent to maximum is decisive against the supposition that it is literally a new star; but a redder type would appear more natural (at least, at the beginning of visibility ten years ago), and a somewhat slower increase of light might have been expected, altho the purely gravitational contraction of a gaseous star is very rapid, according to modern views.

Both the color and spectral type are decidedly opposed to the hypothesis that the star is a long-period variable. The shape of the light curve would also be distinctly anomalous for that interpretation.

The spectral type, the high velocity, and the star's position in the southern Milky Way, not far from some of Barnard's dark markings, all would favor the supposition that the star has just emerged from behind an obscuring nebulosity. As a possible test of this assumption, on June 23rd of this year, under very favorable conditions, I made with the 60-inch reflector an exposure of two

hours on a Seed 30 plate. Stars much fainter than the eighteenth magnitude are shown within 15″ of the new star, but no trace of nebulosity appears.

By superposing a réseau upon the above mentioned photograph and upon others of shorter exposure, the number of stars per square minute of arc was determined. The results for magnitudes 17.5-19.0 appear in the following tabulation, which is symmetrically arranged with respect to the new star. It is difficult to decide if the uneven density in the center indicates the presence of local obscuration.

NORTH

	19	10	11	14	10	16	18	15	14	17
	13	16	15	15	12	8	18	14	8	14
	10	17	15	15	15	11	12	15	16	12
	9	21	13	17	10	14	17	17	17	13
	9	14	19	19	12	22	26	21	16	25
WEST					x					
	10	16	11	10	10	12	13	22	18	14
	14	20	16	17	12	20	25	26	17	15
	17	14	20	25	25	19	19	21	24	17
	26	19	17	19	20	17	21	16	23	17
	14	15	18	22	19	18	13	21	15	19

For areas of one-fourth of a square minute of arc the means of counts in the immediate vicinity of the new star by Miss Ritchie and the writer are as follows:

NORTH

	6	4	4	4	7	2	5	2	2	6
	3	5	3	2	4	3	2	2	5	6
	3	4	6	4	3	5	2	3	7	2
	5	4	6	3	4	6	6	5	4	4
	6	6	4	4	2	4	4	7	5	6
WEST					x					
	4	4	2	3	4	2	6	5	4	6
	7	2	2	4	2	5	1	4	6	4
	4	6	3	4	2	10	6	4	7	5
	2	4	4	4	3	2	2	7	6	4
	4	6	7	6	6	5	6	6	2	6

On the basis of an estimate of the absolute magnitude by Mr. Joy, the distance of 7.1917 is found to be of the order of 500 parsecs. The star therefore probably lies well beyond the nebulosity that is

supposedly associated with the neighboring bright stars of the moving group in *Scorpio*.

As a matter of record the photographic magnitudes of 25 faint stars near the new star are given below, basing the determinations on a series of Mount Wilson plates. On the supposition of a moving nebulosity, these values may in the future serve as a test for further conspicuous change in the brightness of stars of this particular field.

MAGNITUDES IN THE FIELD OF 7.1917

Star	Pg. Mag.	x	y	Star	Pg. Mag.	x	y
1	14.47	−1′56″	+4′25″	14	16.7	+0′ 9″	−1′ 5″
2	14.84	+5 10	−0 49	15	16.7	−1 21	+0 36
3	14.90	−4 45	+2 52	16	16.8	−0 57	+0 15
4	15.14	+1 27	−3 16	17	16.8	+1 28	+0 42
5	15.34	−3 3	+0 15	18	17.1	−0 26	−0 10
6	15.40	+4 49	+1 34	19	17.3	−0 16	−0 2
7	15.40	+5 7	+2 3	20	17.3	+0 4	−0 38
8	15.42	−3 18	−0 4	21	17.6	+0 14	−0 14
9	15.46	+4 56	+2 36	22	18.1	+0 14	+0 6
10	15.78	+4 39	−1 10	23	18.3	−0 20	+0 1
11	15.90	−0 33	+0 4	24	18.3	−0 16	−0 26
12	15.94	+0 38	+0 46	25	18.6	−0 12	+0 4
13	16.0	−1 41	−1 22				

The photographic and photovisual magnitudes of the new star and of a few surrounding stars of the B. D. will be reported at another time when better values can be given. It now appears that the star is not brighter than the eleventh magnitude on the Mount Wilson photographic system.

The Harvard plate of July 9, 1909, is the first to show the star. From Wolf's data I believe we can say that the star did not appear before the ninth of the preceding month. Reducing to a common zero point the magnitude estimates made at Harvard and Heidelberg and calling the maximum photographic value 11.0, I obtain for the years when the star was brightening the following approximate data, which may serve as a condensed photographic history of the star's light.

1908, May 20,	fainter than 15	Leavitt	
June 3,	fainter than 16	Wolf	
1909, May 18,	fainter than 16	Wolf	
June 9,	fainter than 15	Wolf	
July 9,	14.4	Leavitt	
24,	fainter than 13	Wolf	
Aug. 16,	fainter than 11.5	Leavitt	
1910, Mar. 21,	11.3	Leavitt	
Apr. 12,	11.7	Leavitt	
15,	11.6	Leavitt	
May 16,	11.7	Leavitt	
19,	11.5	Leavitt	
1910, June 3,	11.3	Wolf	
4,	11.5	Leavitt	
29,	11.6	Leavitt	
Aug. 7,	11.4	Wolf	
1911, May-July,	11.6	Leavitt, Wolf	
1912, July,	11.5	Leavitt	
1913, May-June,	11.3	Leavitt, Wolf	
1914, June,	11.1	Leavitt, Wolf	
1915, Apr.-July,	11.0	Leavitt, Wolf	
1916, May,	11.0	Leavitt	
1917, May-Aug.,	11.0	Leavitt, Wolf	
1918, June-Aug.,	11.0	Leavitt	

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